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MATHEMATICS

MATRICES AND LINEAR TRANSFORMATIONS (1225)

CHARLES G. CULLEN, *University of Pittsburgh, 272 pp (1966) $8.95.* The first five chapters of this book on linear algebra comprise a one-term text for science, engineering and mathematics students which covers those topics most frequently encountered in applications. Aimed at the sophomore-junior level, the text approaches the subject from the matrix theory point of view rather than from the more abstract approach using linear transformations. Vector spaces and linear transformations are also treated extensively and carefully related to matrices.

CONTENTS: Matrices and linear systems. Vector spaces. Determinants. Linear transformations. Similarity — part one. Polynomials and polynomial matrices. Similarity — part two. Matrix analysis. Numerical methods.

TOPOLOGICAL VECTOR SPACES AND DISTRIBUTIONS, Volume I (2985)

JOHN HORVÁTH, *University of Maryland, 449 pp (1966) $12.75.* This book is an elementary introduction to topological vector spaces and their most important application: the theory of distributions of Laurent Schwartz. The text is intended for use in junior-senior-graduate courses in linear topological spaces and distributions, and as a supplement in courses in partial differential equations. Prerequisites include advanced calculus and a minimum of abstract algebra, metric space topology, and complex function theory.

There is a very detailed discussion, not existing elsewhere in literature, of the spaces used in the theory of distributions.

CONTENTS: Banach spaces. Locally convex spaces. Duality. Distributions.

FUNDAMENTALS OF ABSTRACT ANALYSIS (2410)

ANDREW M. GLEASON, *Harvard University, 404 pp, 25 illus (1966) $13.75.* This text is designed for use in the first course in real variable theory, at the advanced undergraduate-graduate level. An important feature is the explicit formulation of the set-theoretic approach to abstract mathematics. This point of view is maintained faithfully throughout.

Although the foundations are not given axiomatically, the book is entirely consistent with the Hilbert-Bernays-Gödel treatment of set theory.

CONTENTS: Sets. Logic. The set theoretic machinery. Mathematical configuration. Equivalence. Order. Mathematical induction. Fields. The construction of the real numbers. Complex numbers. Counting and the size of sets. Limits. Sums and products. The topology of metric spaces. Introduction to analytic functions.

THEORY OF PROBABILITY (2800)

BERNARD HARRIS, *Mathematical Research Center, University of Wisconsin, 294 pp, 21 illus (1966) $9.75.* Providing the material for a one-semester course at the advanced undergraduate level, this introductory text offers sound preparation for the study of statistical inference, stochastic processes, or further study in probability theory. Subject matter is developed in a logical and consistent manner by the introduction, in Chapter Two, of the Kolmogorov axioms, some of the immediate consequences of which are developed and applied to combinatorial probability problems.

CONTENTS: Introduction. Elementary probability theory. Random variables and probability distributions. Expected values and moments. Random experiments and their description. Distribution theory. Some limit theorems of probability theory.

ADVANCED PHYSICS

THEORY OF OSCILLATORS (0235)

A. A. Andronov, A. A. Vitt, and S. E. Khaikin. Edited and abridged by W. Fishwick, *University College of Swansea, 815 pp, 598 illus (1966) $28.00.* This is a new translation of the second revised Russian edition of a now classic work. It is suitable as a text for undergraduate courses in control problems and an invaluable reference in oscillations, non-linear differential equations, phase plane methods, and stability theory. Its original length has been reduced by half, and references have been added both to works published outside of Russia and to translations of Russian papers available in English. An additional chapter by Professor Fishwick treats all recent significant work.

CONTENTS: Linear systems. Non-linear conservative systems. Non-conservative systems. Dynamic systems with a first order differential equation. Dynamic systems of the second order. Fundamentals of the qualitative theory of differential equations of the second order. Systems with a cylindrical phase surface. The method of the point transformations and piecewise linear systems. Non-linear systems with approximately sinusoidal oscillations. Discontinuous oscillations. Comments on more recent works.

THE PARTICLE KINETICS OF PLASMAS (7019)

I. P. Shkarofsky, T. W. Johnston, and Morrel P. Bachynski, *R.C.A. Victor Company, Limited, 518 pp, (1966) $17.50.*
This volume presents the fundamental ideas of particle kinetics which describe a gaseous plasma and applies these ideas in developing basic equations for plasmas under various conditions. Although only the behavior of gaseous plasmas is discussed explicitly, some of the concepts are equally applicable to plasmas in the liquid or solid state.

CONTENTS: The particle kinetics of plasmas. The Boltzmann equation. Expansion of the electron distribution function: spherical harmonics and time harmonics. Applications of the Boltzmann equation to electron-atom interaction. Elastic collisions and scattering cross sections. Bremsstrahlung and high-frequency electrical conductivity. Coulomb collisions and the Fokker-Planck equation. Transport properties of plasmas. The foundations of magnetohydrodynamics (MHD). Collisionless plasmas in strong magnetic fields — the CGL system.

KINETIC EQUATIONS OF GASES AND PLASMAS (8750)

Ta-You Wu, *State University of New York at Buffalo, 298 pp, 4 illus (1966) $12.50.* The object of this graduate-level text is to introduce the student to some basic aspects of the theory of irreversible processes in gases and some of the recent developments in the formulation of the kinetic equation of plasmas. Rather than attempting to cover a wide range of topics in this rapidly growing field, the author concentrates on a few topics which may serve as a useful introduction. Emphasis is on those theories which start from the Liouville equation.

CONTENTS: Introduction and summary. General theory of irreversible processes in gases. The Boltzmann and Fokker-Planck equations for irreversible processes in gases. Theories of Bogoliubov and of Frieman and Sandri. Bogoliubov's theory — work of Choh and Uhlenbeck on the hydrodynamical stage. Kinetic equation of ionized gases — theory of Vlasov and Landau. Kinetic equation of plasmas on the basis of the Bogoliubov theory. Kinetic equation of plasmas: other theories. Inhomogeneous plasmas. Plasmas in electric and magnetic fields. Theory of Prigogine and Balescu.

ENGINEERING SCIENCE

INTRODUCTION TO FLUID MECHANICS (2809)

RUSSELL W. HENKE, *Milwaukee School of Engineering, 232 pp, 192 illus (1966) $8.75.* Designed for use in a first course in programs of engineering and technology, this text is unique in its fluid power orientation. The book is also characterized by a concentration on industrial requirements. The material has been classroom-proven to be useful both in the ECPD-type of engineering technician curriculum and as the introductory course in the four-year baccalaureate engineering curriculum.

CONTENTS: Introduction to fluid mechanics. Pressure, head, force. Buoyancy, force on submerged surfaces. Displacement, flow rate, continuity of flow, flow velocity, horsepower. Conservation of energy, Bernoulli's equation. Applications of Bernoulli's equation. More applications of Bernoulli's equation. Orifices. Nozzles, tubes, and similar flow devices. Flow under conditions of changing head. Introduction to hydrodynamics. Some further considerations of hydrodynamics. Flow of fluid in pipes. Flow of fluid in pipes (continued). Flow losses in pipes. An example illustrating the calculation of pipe losses. Topics in compressible fluid power systems. Applications.

NETWORKS AND SYSTEMS (6490)

PETER H. O'N. ROE, *University of Waterloo, 336 pp, 185 illus (1966) $12.50.* The primary purpose of this text is to provide insight into a unified discipline of physical system theory, without resorting to analogies. The book discusses the most efficient methods for analysis and precise criteria for their use, and covers multiterminal components. State equations are introduced for the first time in an undergraduate text.

CONTENTS: Mathematical representation of electric networks. Formulation techniques for analytical solutions. Analytical solutions of the network equations. Solution of large networks through subnetworks. State equations for electric networks. Analysis of other linear physical systems. The Laplace transform. Fourier series. Matrices.

COMPUTER SCIENCE

THE CHALLENGE OF THE COMPUTER UTILITY (5720)

DOUGLAS F. PARKHILL, *MITRE Corporation*
207 pp, 21 illus (1966) $7.95
The purpose of this book is to facilitate the growing discussion of "computer utilities" by providing a broad overview of the subject that will reveal something of the history, technology, and economics of the computer utility, and explore some of its possible implications for our society.

An attempt has been made to reach a diversified audience of both computer specialists and laymen. The book touches upon many controversial matters, and is in many places deliberately provocative in the hope of stimulating widespread discussion of the issues raised.

CONTENTS: Introduction. From magic to technology. Modern computer technology. The computer public utility concept and its evolution. Early computer utilities. The technology of sharing. Economic considerations. Legal factors. A look at the future. In conclusion.

TIME SERIES COMPUTATIONS IN FORTRAN AND FAP: Volume I — A Program Library (7022)

STEPHEN MILTON SIMPSON, JR., *1120 pp, (1966) $20.00.*
This book — the first in a planned two-volume work — provides research and applied workers with accurate and fast computer programs in time series analysis. An integrated system of programs in a broad area of scientific research is designed to promote high standards in programming and documentation, and to provide a case book for students of programming.

The "modular" or subroutine approach to programming is adhered to strictly, and novel methods of abstracting and providing access to large numbers of programs are employed. These techniques alleviate the enormous problems of programmer-to-programmer communication and redundant effort in computer usage. The styles of programming and techniques of documentation used are intended to prove of long-term value in the presently inadequately disciplined occupation of programming.

CONTENTS: Introduction. Illustrative usage of programs. Program categorizations. Annotated calling sequences. Program digests. Program statistics. A one-pass subroutine library. Cross reference table for the one-pass library. Subroutine rosters for the one-pass library. Complete program listings.

BUSINESS

THINKING WITH FIGURES IN BUSINESS: Techniques for Improving Your "Number Sense" (2445)

ROGER A. GOLDE, *Golde Management Services, 212 pp, 51 illus (1966) $6.95.* This book is designed for all businessmen who have any dealings with figures. The emphasis is on developing the reader's ability to use his current business knowledge and computational ability to greater advantage. The book deals with figures as they arise *throughout* a business — not only in the financial area. It is one of the first books to explore the informal "pre-analysis" (or "horse sense") phase of thinking with figures.

CONTENTS: The need for number sense. The nature of numbers. Thinking with figures. Simplification has power. Focusing on fundamentals. Quick and dirty arithmetic for businessmen. Developing the habit of change. The art of informal higher mathematics. Creative report looking. Number traps. Conclusion — Thinking with figures.

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For a management training course this book will provide an ideal supplement in "information systems" or "management tools and methods." It can be used as collateral reading or in support of about two weeks of lectures.

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For the senior manager, the book offers a discussion of the possible long-range impact of the computer on the organization.

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This introductory book is intended to provide a foundation upon which further study and experience will build.

The broad coverage of subjects relevant to *decisions* about computers provides a practical background more valuable to the manager than any emphasis on single aspects of computer design, programming, or applications.

Written in Layman's Language

This practical volume was specifically designed to be used and understood by nonspecialists. It therefore contains a carefully tailored summary of experience, with a necessary minimum of technical information in layman's language.

Helpfully Organized and Augmented

The book covers many subjects briefly, presenting enough of an outline of each topic so that the reader can understand its significance and deal intelligently with specialists in the field.

In many cases, readers will subsequently want more comprehensive information. A *bibliography* is therefore appended, containing references to sources of more detail in each area touched upon in the book. A *glossary* of frequently used terms is also provided for the reader's convenience.

Discusses the Computer from Many Aspects

The opening chapters of the book provide *a summary description of the nature of computers,* both conventional and "real time." It is seen that the basic principles of computer operation are quite simple—much easier to understand than those of a television set.

All subsequent discussions of computer applications, computer project development, and various effects of the computer assume a level of knowledge equivalent to that provided by the material in the first chapter.

A chapter on *how computers are acquired and used* follows. Included are discussions of the role of the manufacturer, the user's investments, and the computer's impact on the organization.

Considerable attention is given to *the development of computer applications.* Applications of various systems are discussed thoroughly, and methods for the evaluation of potential computer applications are presented. Later chapters cover systems development, implementation, and operation.

In conclusion, there is a detailed evaluation of *the computer's effects on management, personnel, and the structure of the organization.* Long-range effects and future trends are considered in final chapters.

Contents

1. What Computer Systems Are
2. How Computers Are Acquired and Put to Use
3. Applications of Sequential-Processing Systems
4. Characteristics of Real-Time Systems
5. Applications of Real-Time Systems
6. Evaluating Potential Computer Applications
7. Developing Systems Specifications and Acquiring Equipment
8. Implementing and Operating Computer Systems
9. The Computer Activity in the Organization
10. The Long-Range Effect of the Computer
11. Trends in the Evolution of Future Computers

245 pp, 40 illus (1966) 8715 $7.95

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